FY00 AVIATION SAFETY REPORT

The purpose of the Annual Aviation Safety Report is to inform and raise the awareness of Coast Guard aircrew members regarding aviation mishaps. Improving safety awareness is essential to improving operational performance and preventing aviation mishaps. Your ideas and suggestions related to this report or other safety issues are valuable, please pass them to your unit Flight Safety Officer (FSO) or contact the Aviation Staff at Headquarters (see last page for telephone numbers and email addresses). This report contains Fiscal Year 2000 mishap information as well as prior year and DOD data for comparison. We hope all can leverage this report to evaluate our aviation mishap experience and become involved in mishap prevention.

NOTE: Unless otherwise indicated, only flight mishaps are used for the annual statistics, instead of all mishaps (flight, flight-related and ground). This is the more traditional way of reporting annual numbers (within the aviation industry). Using only flight mishaps for the annual statistics also eliminates some of the fluctuations in the mishap numbers due to reporting variations. The other categories of mishaps are still important and are reviewed separately.

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A WORD FROM THE CHIEF OF AVIATION SAFETY

Measured against the ultimate goal of “bringing the crew back safely”, the last three years have been extraordinary for Coast Guard aviation. We have accumulated over 360,000 flight hours without the operational loss of a Coast Guard aircrew or aviator!!! Given the seemingly endless challenges of diminishing pilot and enlisted experience, declining parts availability, and significant turmoil in what and how we fly (NVG level III, HITRON, etc.), this is a true testament to the professionalism and diligence of those in the field.

However, merely staying alive is hardly a lofty goal. While below historical levels, we still lose about $5,000,000 per year in aviation mishaps. Put in perspective, such annual losses could fund six H65s, five H60s, four C-130s, or four HU25s operations for a year!!! In this era of declining budgets, we can ill-afford to “throw away” this money. Economic arguments aside, many close calls were a few seconds or inches from a tragic loss. As such, we need to learn from the trends found in this report’s data. I would like to highlight two such areas:

First, are the indicators in the area of aviation maintenance error. Figure 1 on the next page depicts the number of mishaps and costs linked to some lapse in maintaining our aircraft. As can be seen, FY00 brought a 40% increase in maintenance related mishaps and the related maintenance mishap costs more than tripled.

Likewise troubling, is the trend in aviation ground mishaps and costs found in Figure 2 on the next page. These are losses for which there was no intent for flight (i.e. towing, jacking, engine-runs, craning of heavy components, etc.) These “pure maintenance” events have increased by a third and associated costs have more than doubled!!! Some of the increase in cost can be attributed to an HU-25 engine fire during ground runs.

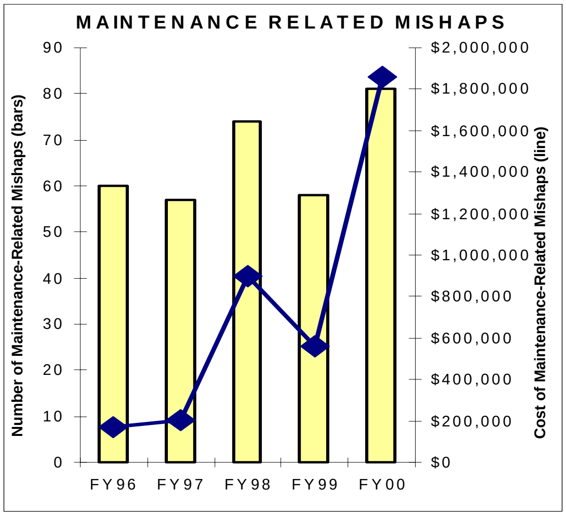


Figure 1

It is due to similar trends in the civilian sector and the other military services that have sparked an interest in Maintenance Resource Management (MRM). MRM, explained more fully in this report, applies human factors training to the complex maintenance system to reduce maintenance error. The Aviation Safety Division has entered the budget process to implement such a program Coast Guard-wide. In the near-term, all Flight Safety Officers were provided a two-day indoctrination in MRM principles. Based on the feedback from contractor training at two air stations, the Coast Guard is developing an "in-house" course drawing from Coast Guard case studies for later rollout.

Until formal MRM training can hit the streets, I challenge all hands to pay particular attention to "doing it right" on the maintenance side. This admonition is not limited to the "wrench turners". Pilots and command cadre play heavily in the world of work for the maintainers. As such, pilots should be mindful of the message sent to the "dark shirts". Are you pressing for that aircraft to be up faster? Are you letting the aircrewman walk to the test flight without the applicable MPC? Can you volunteer to serve as a wing walker when the duty section is stretched?

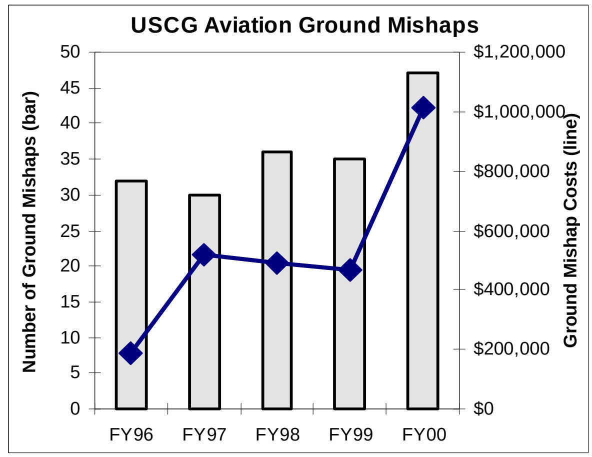


Figure 2

My other concern focuses on our community's experience drain, both officer and enlisted. Figure 3 shows the "landscape" of pilot experience. As can be seen, the bulk of pilots are approaching command cadre billets or retirement. Figure 4 indicates the mismatch between actual and

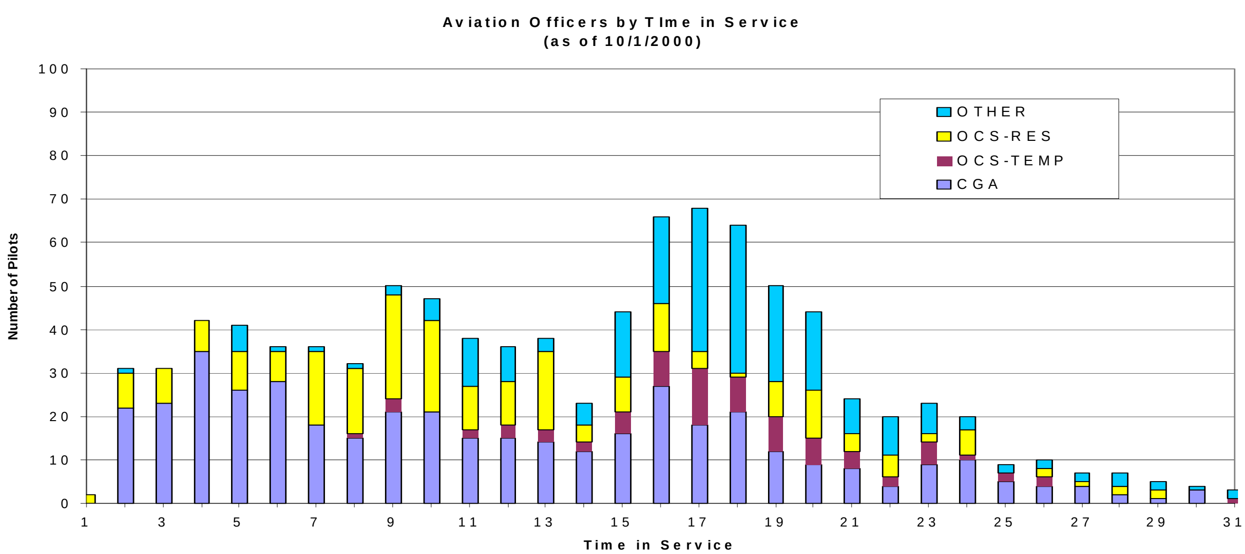


Figure 3

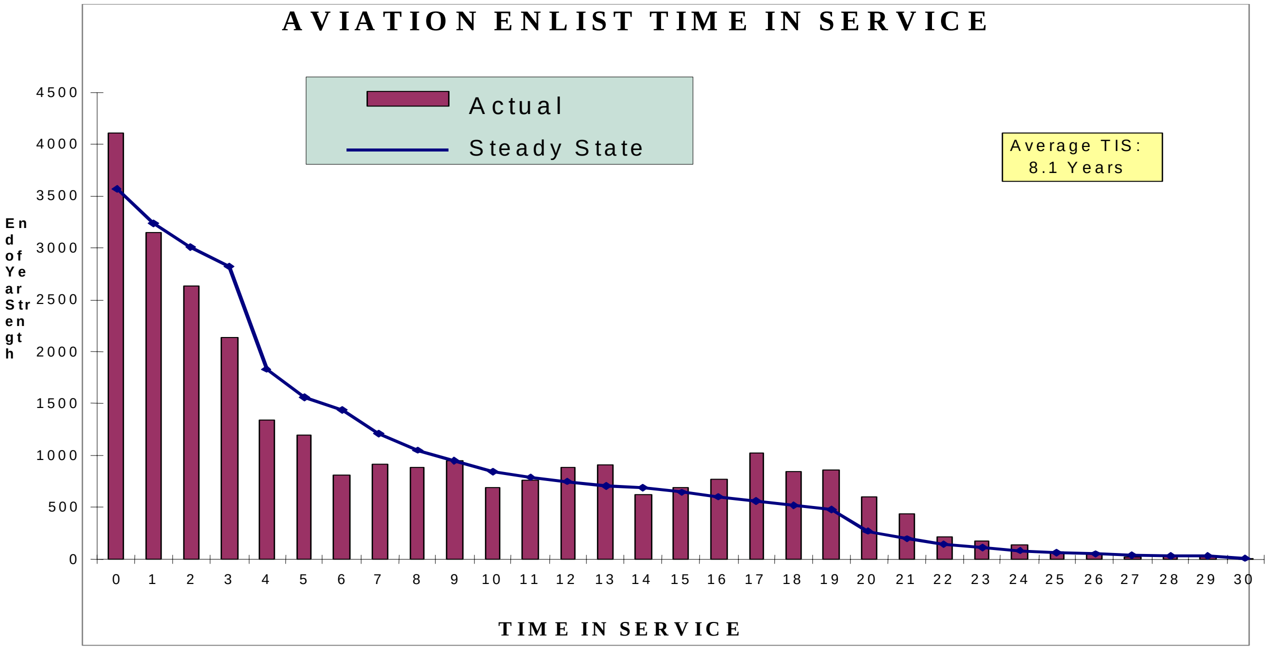


Figure 4

desired time in service for our total enlisted. As you can see, there is a pronounced workforce gap of those with 4 to 9 years of service: the very backbone of our duty standing enlisted aircrew.

In response to decreased experience in the *front and back* of the aircraft, I encourage all crews to fully employ Operational Risk Management (ORM). ORM, explained later in this report, is a more structured way to evaluate and minimize mission risks. These tools may serve to keep us safe until we re-gain the "seat of the pants" wisdom departing from our ranks.

In closing, I urge all to dig into this data and draw your own conclusions. Recognize that the aviation community daily "performs dangerous work in hostile environments" (to quote our Commandant). As such, never let down your guard, keep your head on a swivel, and if something doesn't seem right….it probably isn't and you had better speak up fast!!! After all, safety is an all-hands function.

Fly Safe!!!
CDR Dan Abel

ANNUAL RECAP

Coast Guard aviation had no Class A or B flight mishaps in FY00. Since the release of the FY99 report, CG-2103 inflight fire was upgraded to a Class A flight mishap. The aircraft damage was greater than the original assessments. CG Auxiliary Aviation reported no Class A or B mishaps in FY00. While important and tracked, auxiliary flight hours and mishaps do not count towards the CG mishap rates in this report.

MISHAP CLASS COST BREAKDOWN

Class A	$1,000,000 or greater or death
Class B	$200,000 to $999,999 or serious injury
Class C	$10,000 to $199,999 or minor injury
Class D	less than $10,000

MISHAP CATEGORIES

Flight Mishaps--Mishaps involving damage to Coast Guard aircraft and intent for flight existed at the time of the mishap. There may be other property damage, death, injury, or occupational illness involved.

Flight-Related Mishaps--Mishaps where intent for flight existed at the time of the mishap and there is **NO** Coast Guard aircraft damage, but there is death, injury, occupational illness, or other property damage. (includes self-contained engine mishaps)

Ground Mishaps--Mishaps involving Coast Guard aircraft or aviation equipment where **NO** intent for flight existed and the mishap resulted in aircraft damage, death, injury, occupational illness, or other property damage (e.g., towing, maintenance, repairing, ground handling, etc.)

Auxiliary Aviation Mishaps--Injuries or property damage sustained by an Auxiliarist while under official orders.

CLASS A MISHAP RATE

$$\frac{\text{Number of Class A Mishaps X 100,000}}{\text{Flight Hours}}$$

NOTE: Dollar values of mishap costs are actual annual costs -- not adjusted for inflation.

Table 1

Table 1, displays aviation mishap class and category definitions. Flight mishap costs for FY00 were $1,558,894. This figure is almost half of the annual costs for FY98 and FY99, and the lowest we have experienced since the early 80's. (The low mishap costs can be attributed in part to the lack of Class A mishaps, but in general, our mishap costs are falling). Table 2, displays FY00 summary mishap data.

Total mishap cost (flight, flight-related and ground) for FY00 was $5,297,373, up slightly from last year, but well below the late 80's and early 90's. Of the 230 mishaps reported this year, there were 47 ground and 25 flight-related incidents reported in FY00. The Class ABC flight mishap rate has fallen in the last decade from 0.10 in FY90 to 0.03 in FY00. Figure 5 displays our Class A Flight mishap history along with total flight hours since 1956. Figure 6 (on the next page) displays the Coast Guard aviation Class A flight mishap rates for the past fifteen years. Finally, figure 7 on page 5, provides a comparison of CG aviation safety data to the other armed services.

OPERATIONAL RISK MANAGEMENT

Workforce reduction, along with civilian job opportunities associated with a robust economy, have combined to negatively impact both the number of aviation maintenance personnel on active duty and the experience levels of the Coast Guard's aviation maintenance workforce. While aviation professionals have always informally weighed risks, we need to use our risk assessment skills more than ever in this day of high optempo and decreasing experience levels. We are more prone to take short cuts and cut corners than ever. This means, everyone should stop and think about what they are doing and how it might effect the bigger picture. This is where ORM comes into play.

ORM is something you should use every day, for every activity. It's a process of merely stopping (sometimes for only a few seconds) and thinking

FY00 TOTAL MISHAPS		FLIGHT HRS =		106,614
	FLIGHT	FLT-REL	GROUND	TOTAL
CLASS A MISHAPS	0	0	0	0
CLASS A COST	$0	$0	$0	$0
CLASS A RATE	0.00	0.00	n/a	0.00
TOTAL MISHAPS	158	25	47	230
TOTAL COST	$1,558,894	$2,715,962	$1,022,517	$5,297,373
TOTAL RATE	0.15	0.02	n/a	0.22
COST/MISHAP	$9,866	$108,638	$21,756	$23,032
A/B/C MISHAPS	34	11	10	55
A/B/C COST	$1,281,648	$2,703,019	$970,599	$4,955,266
A/B/C RATE	0.03	0.01	n/a	0.05
COST/MISHAP	$37,696	$245,729	$97,060	$90,096

Table 2

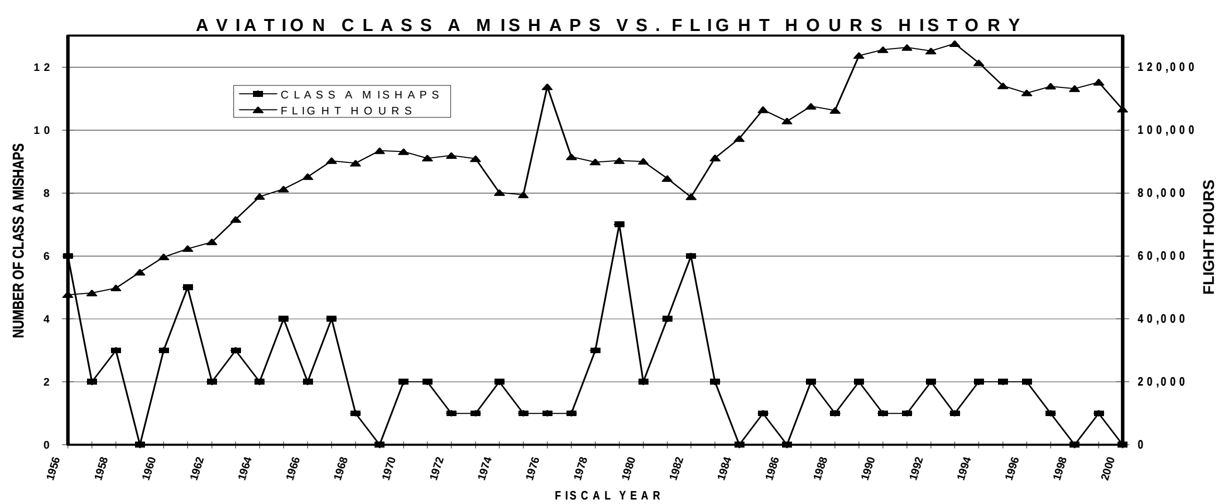


Figure 5

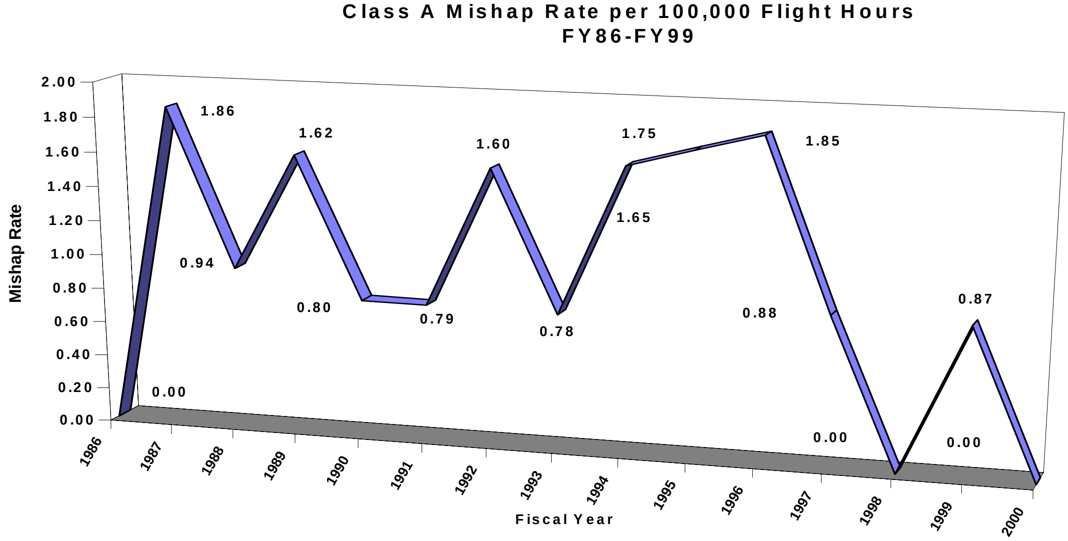


Figure 6

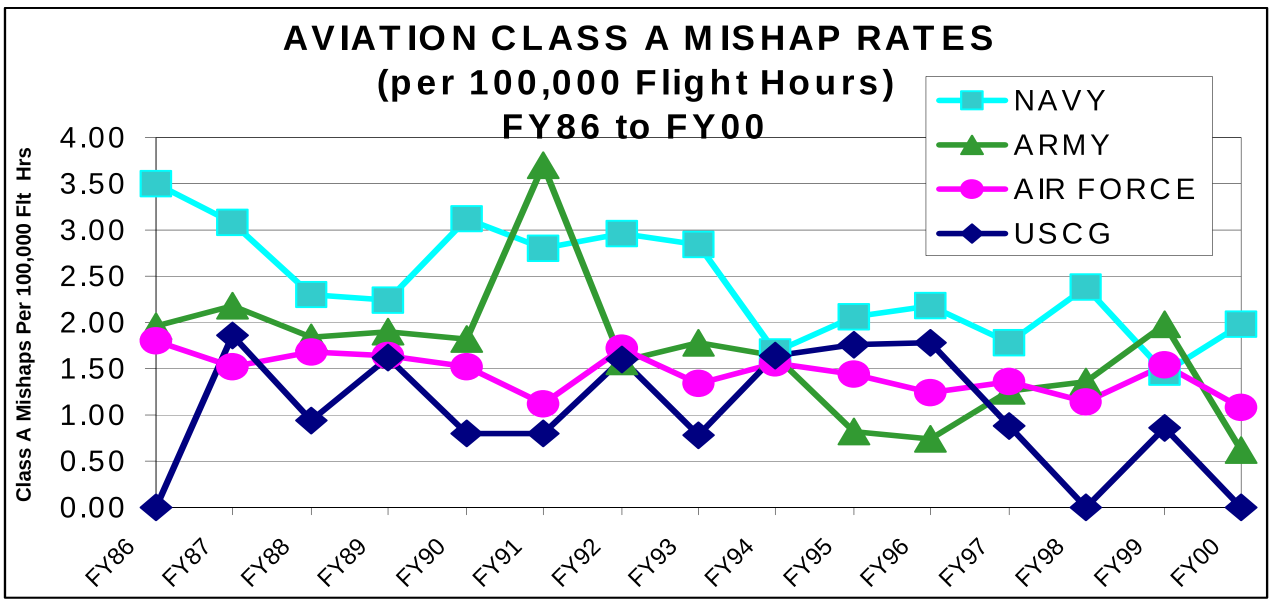


Figure 7

about what you are about to do and how you are going to do it. Are there any hazards you need to be aware of? Is being exposed to those hazards worth what you are trying to achieve? If you have to do it, how do you lessen the risks? That's it, nothing complicated.

All services are realizing the value of ORM, which more formally structures how a crew evaluates and minimizes mission risk. Last spring, the Flight Safety Officers collaborated to develop a useful risk assessment/risk management tool. This was featured in the most recent *Flightlines* magazine. Closer evaluation of risk and use of this matrix are now being included in Crew Resource Management.

ORM is mandated by COMDTINST 3500.3 Operational Risk Management, dtd 23 Nov 00)

MAINTENANCE RESOURCE MANAGEMENT

Today, as aircraft become increasingly reliable, we have reached the point where people, not the airframes, lie at the heart of many unsafe conditions and safety hazards. According to studies, around 15% (USCG is over to 20%) of aviation mishaps involve some element of maintenance human factor error. Efforts are underway throughout the aviation industry to understand more about the human side of maintenance problems.

The term "human error" is used because most mishaps do involve human lapses at some point in the chain of events. Often, the error is far removed from the direct operations or maintenance of the airframe. These errors (or unsafe acts) may not be the sole fault of the person actually doing the work or operating the aircraft at the time of the mishap. Most go back further, and often involve policies, procedures, supervision or training that set the stage for an error or unsafe act. Such a holistic view of an incident will not only reduce the chance of the same error happening again, but also helps to prevent other hazards and problems.

Studies have found some of the most common factors in the work area are:

Confusion, misunderstandings or differences of opinion about procedures. It is not unusual to find workers following informal practices developed on the job. Older, experienced workers will sometimes develop their own practices, which may be different from the approved procedures. Unworkable, confusing or inconvenient procedures also prompt work-arounds, informal procedures and "norms".

Communication breakdowns between people. In a recent survey, senior maintenance personnel were asked to describe the most challenging part of their job. Their most common answer was communicating or dealing with people. Performing in a team requires more than technical know how, and we often overlook the need to develop important communication and people skills.

Pressure or haste. Since the early days of aviation, maintenance personnel have faced pressures to get the aircraft back into service. However, as aircraft become more complex, operators strive to reduce the amount of time that aircraft spend in maintenance. Along with personnel shortages, pressure is a growing fact of life. A particular risk is that personnel faced with real or self-imposed time pressures will be tempted in take shortcuts to get an aircraft back into service quickly. Maintenance systems have built-in safeguards, such as QA inspections and functional tests, designed to capture errors on critical tasks! By necessity, these error-capturing safeguards generally occur at the end of jobs, when pressures to get the job finished are likely to be greatest and the temptation to leave out or shorten a procedure is strongest.

Inexperience. As experience continues to decline in the aviation officer and enlisted ranks, the "seasoned" veteran is getting younger. As such, lessons previously learned in an "apprentice" role are not there.

A lack of tools, or equipment, or spares. Many work-arounds occur in response to a lack of appropriate hardware or spares. Furthermore, a lack of major spares can lead to increased cannibalism of parts from other aircraft, which in turn increases the potential for human error.

Lack of refresher training. Maintenance personnel are like torque wrenches, they need to be recalibrated from time to time. In reality, few receive refresher training. Without such training, non-standard work practices can develop or personnel can lose touch with changes in regulations or procedures.

Lack of learning from incidents. There are usually incidents occurring before a mishap which could act as warnings. Unfortunately, we do not always learn the right lessons from these "red flags". It is never easy to admit a mistake: however, it is even harder when an organization punishes people who make honest mistakes. A punitive culture creates an atmosphere in which problems are quietly corrected or ignored and barriers placed in the way of learning from others' mistakes. We need to recognize that making mistakes is an unfortunate but unavoidable consequence of being human. Once an incident has been reported, the focus should be on identifying system problems, not on identifying deficiencies of the individuals. There may be rare times when incidents are related to intentional acts of malice, but the great majority of maintenance personnel do their jobs with diligence and integrity. Most incidents reflect system problems, which go beyond individual workers. An investigation that results in recommendations directed only at the individuals, are signs that the investigation did not identify the system failures which led to an occurrence.

Fatigue. There is probably no way to avoid overtime or nighttime work in aviation maintenance. However, this does not mean that fatigue levels cannot be managed. Almost all night-shift workers suffer from a lack of quality sleep. One in five who responded to a recent survey claimed they had worked a shift of 18 hours or longer in the last year, with some having worked longer than 20 hours at a stretch. There is little doubt that their ability to do their job was degraded. An important point, just like people who are intoxicated, fatigued individuals are not always aware of the extent to which their capabilities have degraded. You can not self-diagnose fatigue.

Conclusion. Workforce reduction and degradation in experience levels has occurred in the Coast Guard without substantial decreases in the optempo or flying hours. This loss of personnel and experience is reflected, at least anecdotally, by an increase in the Coast Guard's aviation ground mishaps compared to the prior years. Almost all aviation ground mishaps list some form of human factors as one of the cause factors. (see figure 12 on page 9 respectively)

Maintenance resource management represents the next logical step in the evolution of team-based safety behaviors. Just as technical skills alone were not enough for flight crews to manage complex systems (thus mandating Crew Resource Management training for all Coast Guard aviation personnel), Maintenance Resource Management training will teach aircraft maintenance personnel the skills that will enable them to work safely in a complex maintenance system. The overall goal of Maintenance Resource Management training is to integrate aviation maintenance personnel's technical skills with interpersonal skills and basic human factors knowledge in order to improve communication, effectiveness, and safety in aircraft maintenance operations.

MISHAP REPORTING

The aviation community benefits from a positive attitude towards mishap reporting. Honest and open reporting is essential if we are to retain a healthy safety culture. Reluctance to report mishaps is understandable. However, in the interest of mishap prevention, loss control, mission readiness and most important, the protection of our people, it is a vital part of our effort to learn how to prevent mishaps. Keep this in mind when writing mishap reports.

Reporting mishaps, sharing close calls, lessons learned, mistakes and passing the word on what happen and what was done to reverse the action or prevent a recurrence is an important part of preventing future mishaps. There are numerous avenues that can be used to spread the word, so others can learn; safety stand downs, briefings, “there I was” articles, “true confession” sessions, *Flightlines* magazine articles, CO's comments in the mishap message, etc. By exchanging mishap information and learning from each others' incidents, mishaps can be prevented.

Since there are very few new ways of crashing aircraft, we need to learn from our history. We can't afford to keep repeating the same mistakes. We must never forget that Class C or D mishaps are generally no more than a thin line from being an incident with catastrophic consequences. Each incident should serve as a warning that prevention efforts need to be intensified. As illustrated by the “1-30-300 rule” (and similarly, the mishap iceberg or pyramid), for each major accident there are thirty minor incidents and 300 close calls that should have been a warning sign, but went unheeded. These analogies illustrate why it is important to concentrate and learn from little mistakes and close calls.

The Aviation Safety Division urges you to view mishap messages as opportunities to learn and to share experiences. FSO's and Commands are encouraged to report all incidents, even those without damage or dollar cost. These incidents provide important heads up to other units and topics for hangar flying sessions. This is information that can be used as tools for mishap prevention.

RECOMMENDED ACTIONS

Unless you've worked at Headquarters, ATC, ARSC or one of the Stan Teams, you may never have heard of the Recommended Action Tracking System (a.k.a. “RATS”). RATS is a tracking system for the recommendations made by the Commandant assigned mishap investigations, unit mishap messages, after action reports, etc. Most RATS are connected to an aviation mishap, but the system tracks any safety-related recommendation.

Periodically, each headquarters aviation office is given a report of the new and pending recommendations in RATS. Each new recommendation is reviewed to verify that it is a valid or attainable recommendation. They are also reviewed to be sure that RATS is the appropriate way to accomplish the recommendation. Once it is determine that a recommendation will be taken for action, it becomes an active/pending recommendation. RATS then tracks the progress of the item until it is completed or closed out. As such, staff element are held accountable to those reporting mishaps and recommendations in the field.

Since the inception of RATS in 1990, 760 recommendations have been addressed, 113 of those are still pending some type of action. FY00 began with 160 pending RATS, 89 new RATS were submitted and 136 were closed out. Of the 113 pending RATS, some are being researched for a workable solution or funding is needed to implement the corrective action. Keep feeding the RATS, those "doing the doing" in the field know best how to work safer.

FLIGHT RELATED MISHAP REVIEW

Although not included as part of the annual aviation mishap rates, flight-related mishaps are important. Flight-related mishaps are mishaps where there was intent for flight, but no aircraft damage. Included in this category are injuries (with no aircraft damage), near midair collisions, foreign object damage and some weather-related mishaps. Flight-related mishap reports also include close calls, lessons learned and incidents that have value to the rest of the fleet. These reports are a valuable mishap prevention tools.

Near Midair Collision

There were only three near midair collisions (NMAC) reported in FY00, (CG five-year average for NMAC is 11 incidents). Reported NMAC's have continued to decrease since TCAS was installed in CG aircraft in the mid-nineties. One reported NMAC's involved civilian aircraft and two involved military aircraft.

Aviation Injury

There were fifteen mishaps reported involving injury to CG aviation personnel. The number of reported injuries to CG aviation personnel remains fairly constant. Over one half of these injuries involved improper procedures, the wrong tool, improper or poorly design equipment. Injuries included five people hurt during hoisting (four rescue swimmers and one boatcrew), two injured backs, two injured fingers, two falls and two cut heads. Two injuries occurred during drops and six occurred during maintenance activities.

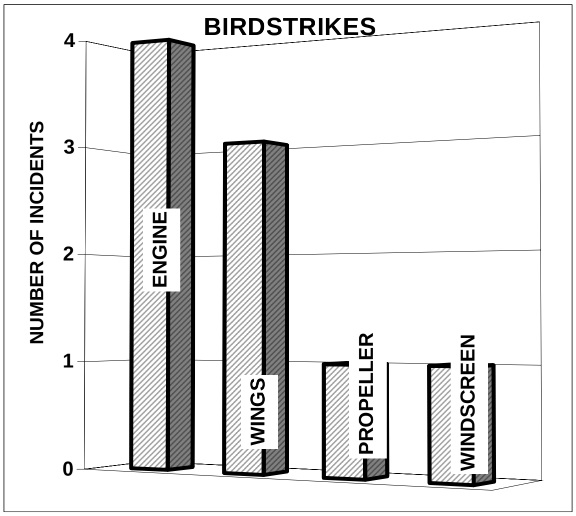


Figure 8

Birdstrikes/FOD/Engine Failures

There were nine incidents involving birdstrikes reported in FY00, up from last year. Birdstrikes resulted in damage to four engines, three wings, a propeller and one windscreen for a total of $243,422 in mishap costs, up from last year (see figure 8).

There were twelve FOD incidents reported this year resulting in $974,387 of damage, down from previous years. FOD caused $338,611 of damage to the engines of three HU25, three HH65, one C130 and one HH60. FOD also damaged two HH65 fuel systems, one HH65 tail rotor and an HU25 engine and nose landing gear resulting in $635,776 damage (see figure 9).

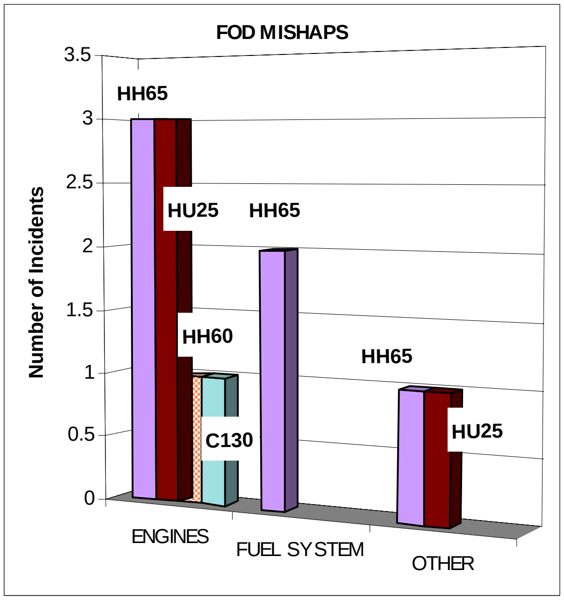


Figure 9

Ten inflight engine failures or shutdowns occurred resulting in just under $3,000,000 in mishap costs. The Falcon and the Dolphin had three inflight failure, while the Jayhawk reported two engine failures and the Herc experienced two reduction gearbox failures (see figure 10).

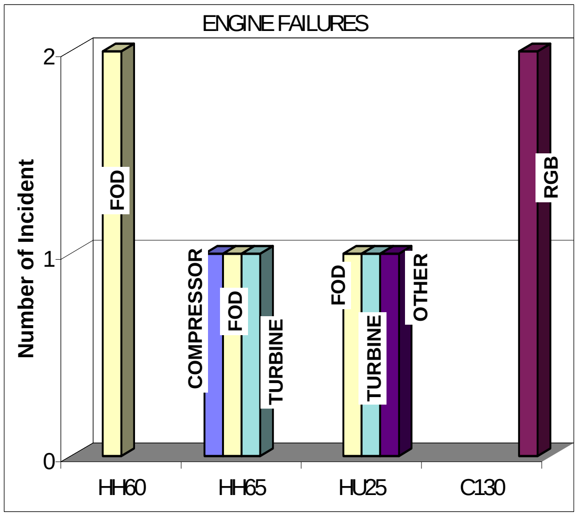


Figure 10

Weather-Related

Weather contributed to eleven mishaps and resulted in $236,711 damage. These incidents included electronic malfunctions due to moisture, parts prematurely failing due to corrosion, cold weather and airframes damaged by wind, rain or ice.

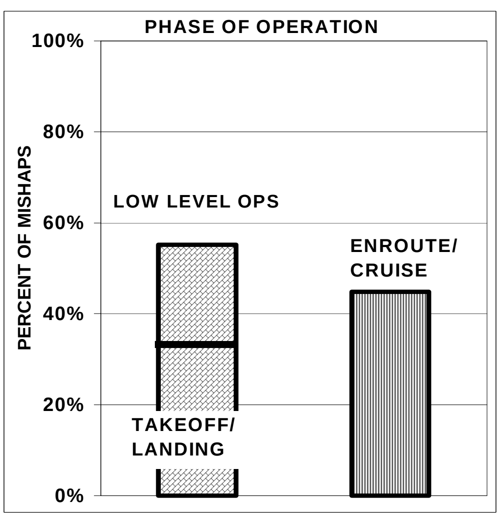


Figure 11

PHASE OF OPERATIONS

Most aviation mishaps occur during takeoff, landing, and low level operations, not enroute. In FY00, 46 mishaps (29% of reported flight mishaps) occurred during some phase of landing or takeoff and 34 mishaps (22%) were during low-level ops (drops, hoist, hover, autos, search, etc). (see figure 11). As expected, mission profiles that produce a larger number of takeoffs, landings or low-level operations increase the likelihood of a mishap. This is important to remember when making risk management decisions.

SHIP-HELO MISHAP REVIEW

There were fifteen mishaps reported in FY00 (down from previous years) involving ship-helo operations totaling only $49,069 in mishap costs. Seven (41%) of these mishaps were unique to the ship-helo environment (e.g., aircraft damage due to ship movement, portable hangar, HIFR mishaps, and tiedowns). The remaining 59% were not the result of the ship-helo interface (e.g., chip lights, hydraulic problems, NMAC, indicator problems, etc.).

Ship-helo related mishaps make up less than 10% of the total mishaps reported and less than 5% of total mishap costs. The flight mishap rate for ship-helo ops is 1.93 per 1000 hours flown compared to the total aviation flight mishap rate of 1.42 per 1000 flight hours. Aviation “ground mishaps” (with no intent for flight) service-wide, account for 21% of the total aviation mishaps report, while “ground mishaps” account for 26% of the ship helo mishaps. **BZ for safe ops in a very demanding environment.**

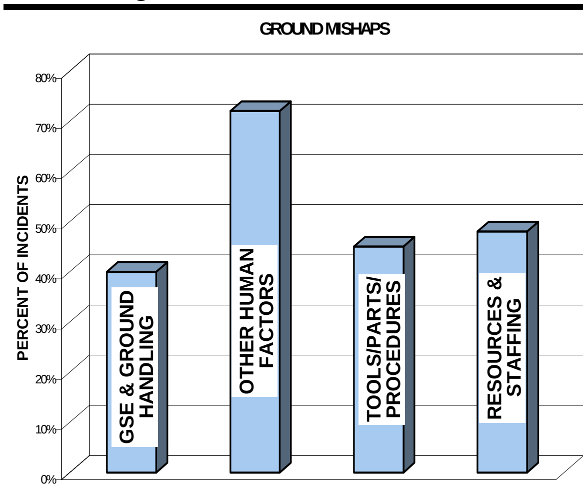


Figure 12

GROUND MISHAP REVIEW

Forty-seven aviation ground mishaps were reported in FY00 for a total mishap cost of $1,012,517. (The increase in ground mishap costs this year are due to an HU-25 engine fire during ground runs). Like previous years, almost half of the ground mishaps reported, and more than 40% ($561,967) of the ground mishap costs resulted from incidents involving Ground Support Equipment (GSE), towing, blade folding, fueling, washing or jacking. Three quarters of ground mishaps listed some form of human factors as one of the cause factors. (see figure 12) The wrong tool/equipment, the wrong part or incorrect procedures accounted for 45% of the ground mishaps. Not surprising, almost half the ground mishaps list staffing, resources, insufficient personnel and lack of experience or knowledge as a cause factor.

MAINTENANCE HUMAN ERROR MISHAPS

Eighty-three mishaps listed some type of maintenance human factor error as a cause factor. These mishaps included incomplete passdown, poor communications, inappropriate procedures, improperly followed procedures, lack of supervisor review or Q/A problems. Eighty percent of the mishaps involved incomplete, improperly followed, inappropriate or unavailable procedures. Twenty-six (30%) mishaps involved the wrong part, poor equipment/part design, or lack of parts. Inattention, complacency or awareness was a factor in a third of the incidents reported in FY00. Poor passdown, incomplete checklist or poor communications were also listed in about a third of the mishaps. Some form of inexperience, lack of training, or staffing were factors in over a third of the incidents. Workload, feeling rushed or lack of resources were mentioned in 25% of the mishaps.

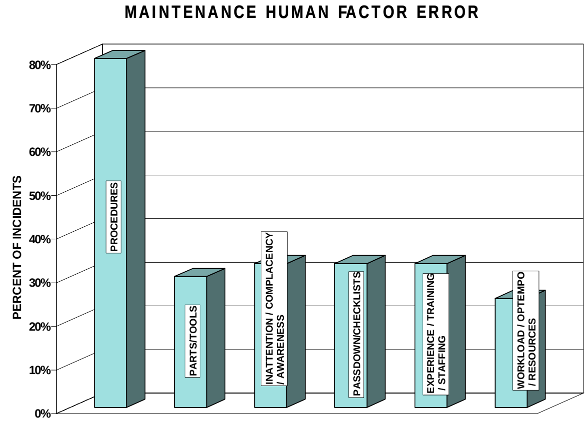


Figure 13

SUMMARY INFORMATION

Coast Guard aviation flight mishap costs for FY00 were over $1.5 million, down again as illustrated in Figure 14. Figure 14 shows flight mishap costs (for all airframes) for the last ten years. Total Coast Guard aviation mishaps costs (flight, flight-related and ground mishaps) for FY00 were almost $5.3 million (up slightly). Mishap costs are decreasing in part because there were no Class A mishaps in FY98 and FY00. Tables 3 and 4

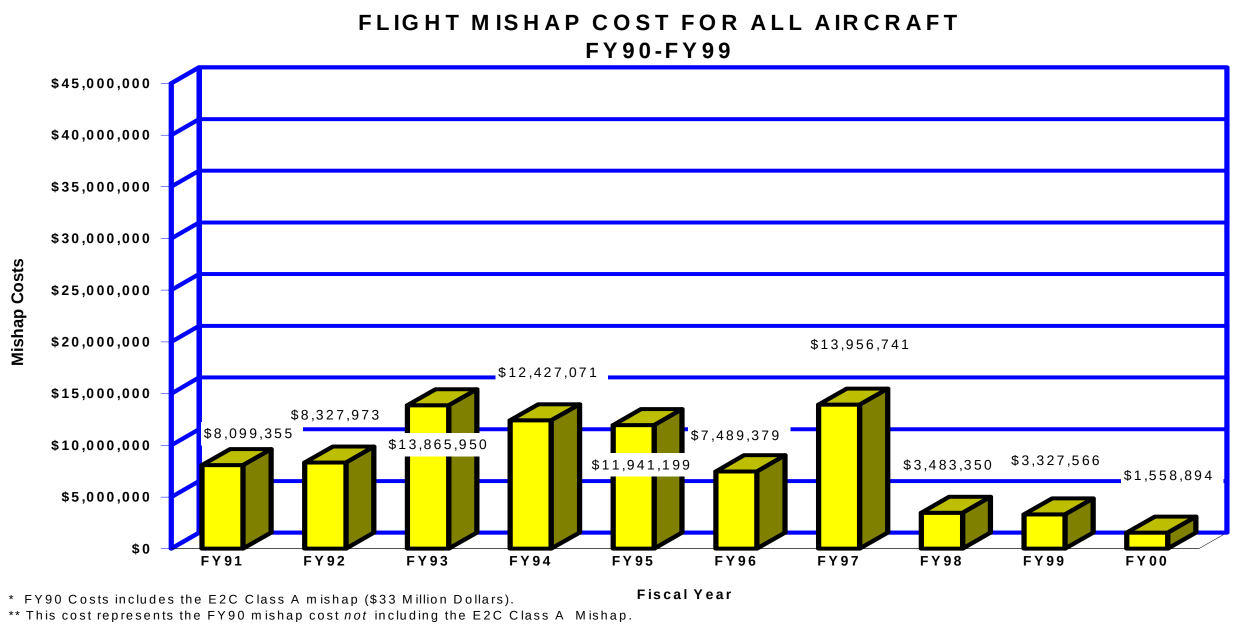


Figure 14

FY00 FLIGHT MISHAP PERCENTAGES				
CLASS	MISHAPS	% of TOTAL MISHAPS	COST	% of TOTAL COST
A	0	0%	$0	0%
B	0	1%	$0	0%
C	34	22%	$1,281,648	82%
D	124	78%	$277,246	18%
TOTAL	158		$1,558,894	

Table 3

FY00 FLIGHT MISHAP PERCENTAGES						
AIRCRAFT	MISHAPS	% of TOTAL MISHAPS	COST	% of TOTAL COST	FLIGHT HOURS	% of FLIGHT HOURS
HH60	35	22%	$380,832	24%	23,684	22%
HH65	66	42%	$534,632	34%	45,663	43%
MH90	1	1%	$2,080	0%	0	0%
C130	23	15%	$307,817	20%	20,060	19%
HU25	33	21%	$333,533	21%	15,997	15%
VC4 &C20	0	0%	$0	1%	1,210	1%
TOTAL	158		$1,558,894		106,614	

Table 4

display the summary data for each airframe. The pie charts (Figures 15, 16 and 17) show the percentage of total mishaps, flight hours and total mishap costs for each airframe. As expected, each airframe represents roughly the same percentage of mishaps as flight hours (figures 15 and 17).

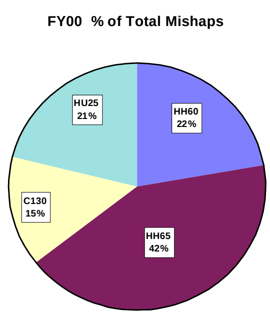


Figure 15

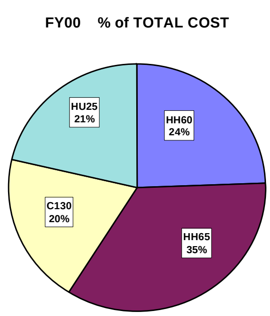


Figure 16

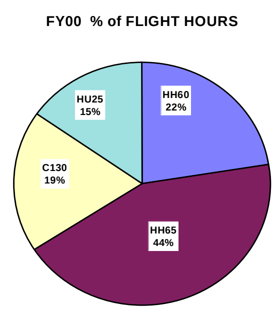
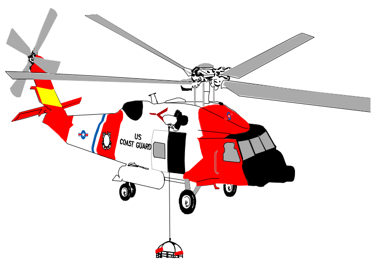


Figure 17

AIRFRAME REVIEWS

The following four pages contain mishap data for each major aircraft type. Note: Total mishaps, mishap costs and the mishap rates for all aircraft are decreasing.

HH-60J MEDIUM RANGE RECOVERY (MRR)



The HH-60J flew 23,684 hours (22% of the total flight hours) and reported 35 flight mishaps (22% of total reported flight mishaps). Mishaps costs were down (about half the FY90 and FY99 mishap costs ($380,832). The HH-60J mishap rate (0.15) for FY00 was the lowest it has been for the Jayhawk.

HH-60J Flight Mishaps for FY00

Aircraft	Class	No. Mishaps	Cost
HH-60J	A	0	$ 0
	B	0	$ 0
	C	7	$ 335,605
	D	28	$ 45,227
Totals		**35**	**$ 380,832**

Table 5

HH60 ABCD	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR	HH60 ABC	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR
FY96	106	$1,093,247	24,732	0.43	$10,314	$44	FY96	24	$949,050	24,732	0.10	$39,544	$38
FY97	39	$782,289	25,081	0.16	$20,059	$31	FY97	9	$756,105	25,081	0.04	$84,012	$30
FY98	66	$734,948	25,266	0.26	$11,136	$29	FY98	13	$636,541	25,266	0.05	$48,965	$25
FY99	56	$798,552	25,207	0.22	$14,260	$32	FY99	14	$710,902	25,207	0.06	$50,779	$28
FY00	35	$380,832	23,684	0.15	$10,881	$16	FY00	7	$335,605	23,684	0.03	$47,944	$14

Table 6

HH60 Flight Mishap Data

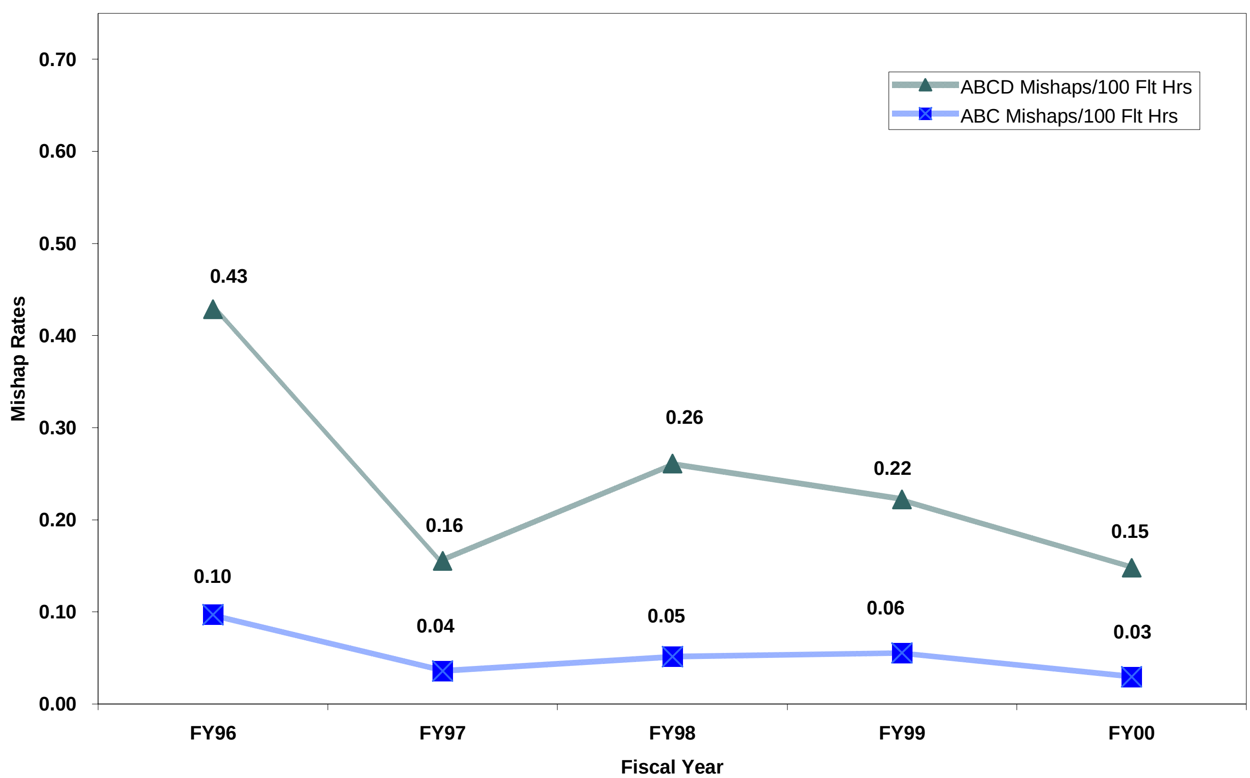
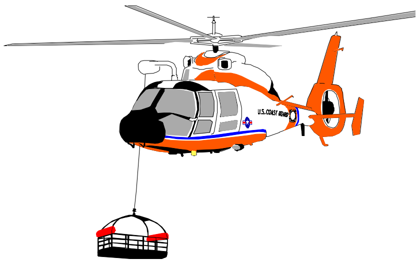


Figure 18

HH-65A SHORT RANGE RECOVERY (SRR)



The HH-65A flew 45,663 hours (43% of total flight hours), the most of all the airframes. This airframe reported the most mishaps (66 mishaps, 42% of reported flight mishaps). The HH65 mishap costs, along with its mishap rate were down in FY00 for the third consecutive year.

HH-65A Flight Mishaps for FY00

Aircraft	Class	No. Mishaps	Cost
HH-65A	A	0	$ 0
	B	0	$ 0
	C	13	$ 398,726
	D	53	$ 135,906
Totals		**66**	**$534,632**

Table 7

HH65 ABCD	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR	HH65 ABC	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR
FY96	249	$4,089,497	48,998	0.51	$16,424	$83	FY96	18	$3,853,719	48,998	0.04	$214,096	$79
FY97	118	$12,784,629	49,794	0.24	$108,344	$257	FY97	21	$12,617,588	49,794	0.04	$600,838	$253
FY98	100	$1,084,566	48,540	0.21	$10,846	$22	FY98	19	$954,866	48,540	0.04	$50,256	$20
FY99	92	$829,471	49,780	0.18	$9,016	$17	FY99	17	$694,272	49,780	0.03	$40,840	$14
FY00	66	$534,632	45,663	0.14	$8,100	$12	FY00	13	$398,726	45,663	0.03	$30,671	$9

Table 8

HH65 Flight Mishap Data

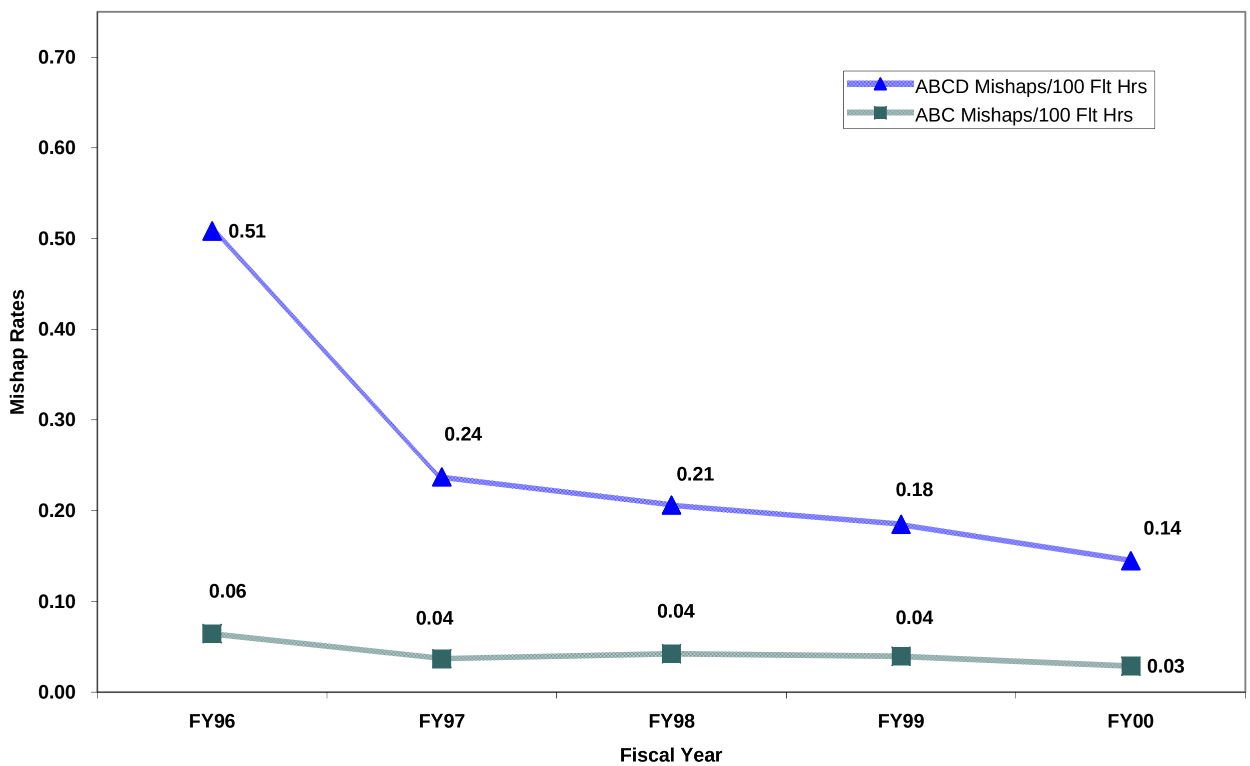
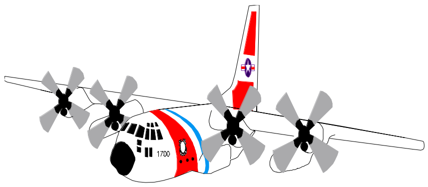


Figure 19

HC-130H LONG RANGE SEARCH (LRS)



The HC-130H flew 20,060 hours (19% of total flight hours) and reported the fewest flight mishaps (23 mishaps, 15% of reported flight mishaps). The HC-130H also had the lowest mishap rate and mishap costs of all the airframes in FY00 (0.11 and $307,817).

HC-130 Flight Mishaps for FY00

Aircraft	Class	No. Mishaps	Cost
HC-130	A	0	$ 0
	B	0	$ 0
	C	7	$ 257,712
	D	16	$ 50,105
Totals		**23**	**$ 307,817**

Table 9

C130 ABCD	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR	C130 ABC	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR
FY96	54	$727,838	22,478	0.24	$13,478	$32	FY96	22	$673,330	22,478	0.10	$30,606	$30
FY97	21	$112,062	23,421	0.09	$5,336	$5	FY97	5	$93,501	23,421	0.02	$18,700	$4
FY98	37	$427,881	23,249	0.16	$11,564	$18	FY98	8	$342,018	23,249	0.03	$42,752	$15
FY99	26	$387,385	23,108	0.11	$14,899	$17	FY99	8	$352,058	23,108	0.03	$44,007	$15
FY00	23	$307,817	20,060	0.11	$13,383	$15	FY00	7	$257,712	20,060	0.03	$36,816	$13

Table 10

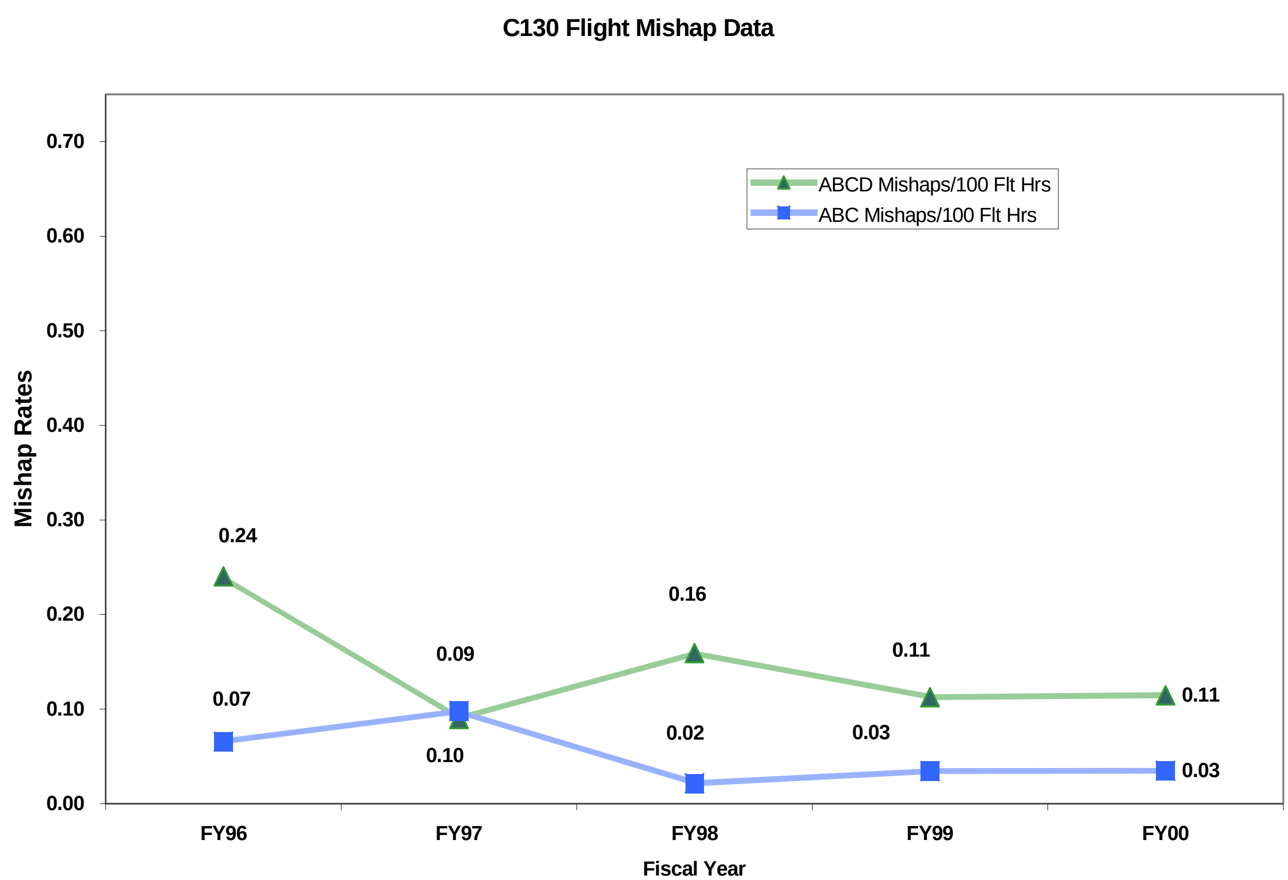
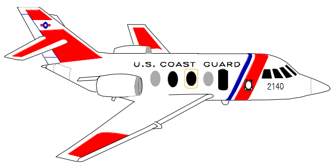


Figure 20

HU-25 MEDIUM RANGE SEARCH (MRS)



The HU-25 (all models) flew the fewest hours (15,997 hours, only 15% of the total flight hours) and reported 33 mishaps (21% of total mishaps). The Falcon's mishap rate was down for the third year. Mishap costs also dropped again this year.

HU-25 Flight Mishaps for FY00

Aircraft	Class	No. Mishaps	Cost
HU-25	A	0	$ 0
	B	0	$ 0
	C	7	$ 289,605
	D	26	$ 43,928
Totals		**33**	**$ 333,533**

Table 11

HU25 ABCD	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR	HU25 ABC	NO. MISHAPS	COST	FLIGHT HOURS	MISHAPS/ 100 FLIGHT HOURS	COST/ MISHAP	COST/ FLIGHT HOUR
FY96	82	$378,797	14,472	0.57	$4,619	$26	FY96	11	$263,791	14,472	0.08	$23,981	$18
FY97	44	$217,107	14,467	0.30	$4,934	$15	FY97	4	$125,307	14,467	0.03	$31,327	$9
FY98	57	$1,235,955	14,972	0.38	$21,683	$83	FY98	13	$1,109,861	14,972	0.09	$85,374	$74
FY99	35	$1,312,058	15,491	0.23	$37,487	$85	FY99	8	$1,244,893	15,491	0.05	$155,612	$80
FY00	33	$333,533	15,997	0.21	$10,107	$21	FY00	7	$289,605	15,997	0.04	$41,372	$18

Table 12

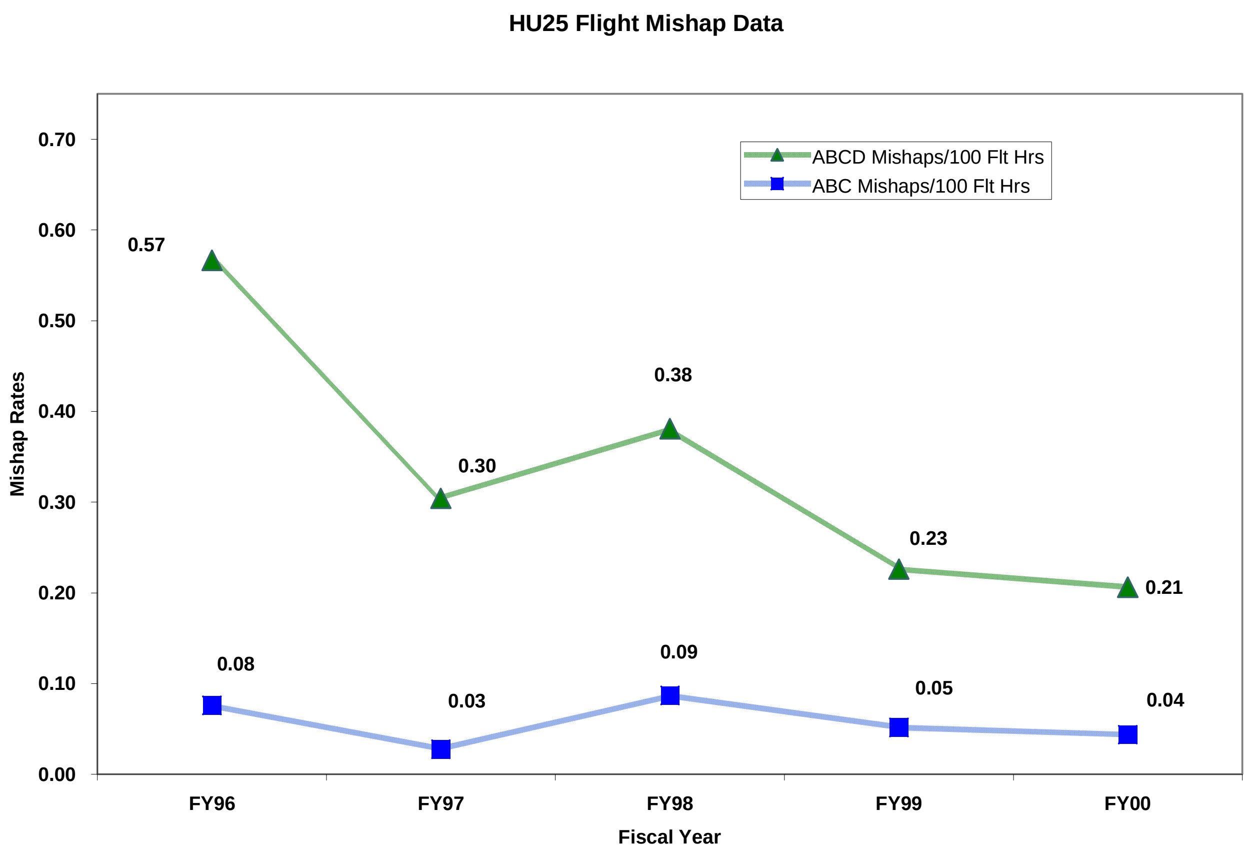


Figure 21

CLASS A AND B MISHAP SUMMARY

Tables 13 and 14 summarize the Class A and B flight mishaps for the last ten years. Mishaps are seldom, if ever the result of a single cause. They are a combination of several cause factors. When viewed alone, each cause factor often appears insignificant. A mishap is a sequence of seemingly unrelated events which results in tragic consequences.

Tables 13 and 14 also illustrate how almost all aircraft mishaps can be traced to a human failure. Effective accident prevention must include the supervisory, command climate and support aspects (tower personnel, training, acft design, manufacturer, etc.) of human involvement in aircraft operations; not just those most visible or directly involved (maintenance and flight crews).

Accidents rarely involve a deliberate disregard of procedures. They are generally caused by situations in which a person's capabilities are inadequate or are overwhelmed in an adverse situation. When considering human performance in an accident or incident, a person's decisions and actions should be evaluated against the reasonable degree of performance that could be expected from another person with equivalent knowledge, qualifications and experience. Humans are subject to a wide range of variables, situations and circumstances and they cannot all be easily foreseen. Careful attention should therefore be given to all the factors that may have influenced the person involved in a mishap.

CLASS A MISHAP SUMMARY
FY91-FY00

DATE	ACFT	SUMMARY	CAUSE FACTORS
AUG 1991	HH65	During daylight, low speed photo pass, aircraft experienced uncommanded left yaw and impacted ice.	Aircrew Error
JAN 1992	C130	Uncontained failure of # 3 reduction gearbox after takeoff. Prop and front half of gearbox departed nacelle, struck fuselage resulting in explosive decompression and severing of MLG hydraulic line. Aircraft landed without further damage.	Overhaul Procedures, Material
MAR 1992	HH65	Aircraft impacted water during practice MATCH to water at night.	Fatigue, Disorientation, CRM, Supervisory & Aircrew Error
AUG 1993	HH65	During daylight delivery of ATON personnel and equipment, aircraft crashed while landing on elevated helipad.	Aircrew Error, CRM, Training
JULY 1994	HH65	Aircraft impacted side of cliff in low visibility during night SAR mission to assist S/V aground.	Communications, Situational Awareness, CRM, Aircrew Error
AUG 1994	HH65	Hardlanding during daylight practice autorotation, aircraft impacted ground, slid and rolled on side.	Aircrew Error, CRM, Training
JAN 1995	HH65	During night pollution surveillance flight, with two MSO personnel on board, aircraft experienced engine fluctuations. While analyzing problem, aircraft flown into water.	Situational Awareness, CRM, Aircrew Error, Mechanical
AUG 1995	HH65	During daylight flight, deployed helo experienced rapid left yaw while conducting left pedal turn in a hover. Aircraft accelerated through wind line, spin could not be countered. Aircraft impacted water.	Design, CRM, Aircrew Error, Situational Awareness, Training
DEC 1995	RG-8	While conducting patrol, sensor operator and pilot detected smoke in cockpit. Pilot determined engine was on fire, secured engine and crew bailed out (as required by emergency procedures). Crew was recovered within an hour after entering water. Aircraft was lost at sea.	Cause of engine fire unknown, Training, Design
APR 1996	HH65	At end of 5-hour mission, pilot and aircrewman were practicing hover maneuvers over taxiway. During third hover, aircraft entered left turn; pilot was unable to counter. Aircraft continued spinning left and impacted ground.	Aircrew & Supervisory Error, Fatigue, Procedures, Design
JUN 1997	HH65	Night SAR in high winds and seas for sailboat taking on water. Shortly after arriving on scene, on scene resources lost comms with aircraft. Crew of four did not egress and the helicopter sank in 8,500 feet of water.	Aircrew & Supervisory Error, Material, Design, Assignment, Trng, Policy/Procedures
AUG 1999	HU25	Rear compartment fire light illuminated during touch and go. Crew continued takeoff and called out boldface procedures. Fire light remained illuminated, emergency declared. Rear compartment fire light extinguished approx 10 sec after fire extinguisher activated. Hyd sys light illuminated during “before landing checks”. Acft landed, crew egressed and fire dept extinguished fire. Major fire damage.	Maintenance, QA, Procedures, Training, Mechanical, Supervision,

Table 13

CLASS B MISHAP SUMMARY
FY91-FY00

DATE	ACFT	SUMMARY	CAUSE FACTORS
MAR 1991	HH65	While delivering passengers to Navy vessel, pilot pulled excessive collective overtorquing MGB and overspeeding both engines. Pilot was mistakenly advised to return to CG Cutter. Aircraft experienced hard landing upon return to CG cutter.	Supervisory & Aircrew Error, Training, CRM, Situational Awareness, Procedures
MAY 1992	HU25	Aircraft landed with left main landing gear up after MLG failed to extend. MLG unlock control cable separated, preventing MLG door from opening and stopping landing gear sequence.	Material, Aircrew Error, CRM, Procedures,
MAY 1992	HH60	During live litter hoist from an RHI, litter cables failed, dropping the litter approximately 30 ft to the water.	Procedures, Maintenance, Supervisory,
DEC 1992	C130	Engine turbine wheel failed inflight. Damage limited to engine. Failure attributed to material fatigue and manufacturing processes.	Material, Procedures, Manufacture
MAR 1993	HH65	At end of offshore SAR, pilot misdiagnosed and improperly managed #2 engine indicating system failure and secured #2 engine. Situation further aggravated by series of uncoordinated inputs by both pilots. FM recognized situation, advanced FFCL, allowing the remaining engine to regain power.	Mechanical, Aircrew Error, CRM, Training, Procedures
MAY 1993	HH65	During instrument approach to hover over water, rotorwash engulfed aircraft in salt spray. Pilots lost visual contact with surface resulting in MGB overtorque and overspeeding both engines during ITO.	Procedures, Darkness, Environment, Aircrew, CRM, Disorientation
AUG 1993	HH3	During flood relief support, MRBs contacted hangar, as crew completed turn into parking space. Crew had parked in same position several times.	CRM, Aircrew, Situational Awareness, Procedures
MAR 1994	HH65	Fenestron contacted runway during practice single engine landing for annual Stan check ride.	Awareness, Training, Supervisory & Aircrew
SEPT 1994	HU25 FltRel	Crew dropped a DMB to aid relocation of lone raft at sea and departed scene for fuel. Unknown to crew, DMB struck a female in the raft. Rafters were later rescued, female underwent surgery and recovered.	Supervisory & Aircrew Error, Procedures
APR 1995	HH60	Returning along coast from training flight in VFR conditions, crew felt abnormal vibration. Vibrations were so severe, pilots had difficulty reading instruments and controlling aircraft. Aircraft landed immediately on boulder-strewn beach damaging the aircraft. MRB tipcap departed inflight.	Material Failure
JUL 1995	HH65	Deployed aircraft taxied into side of Navy hangar. Five navy personnel inside hangar received minor shrapnel injuries. Aircraft sustained sudden stoppage damage and shrapnel damage.	Aircrew & Supervisory Error, Procedures, CRM, Distractions, Judgement
AUG 1995	HH65	PAC was attempting to park aircraft between two aircraft. MRB struck chain link fence. Two other aircraft and several buildings sustained shrapnel damage.	Aircrew Error, Distractions, Situation, Awareness, CRM
DEC 1996	HH60 FltRel	Aircraft was diverted from a routine training flight to assist F/V reporting taking on water and sinking. Two PIW were hoisted using a basket recovery, third PIW was recovered using rescue swimmer direct deployment. The victim's survival suit was improperly donned and filled with water. The added weight caused the victim to slip through the strop. FM and RS encountered difficulties trying to bring the victim into the cabin. The victim slipped out of the strop and fell to the water.	Environment, Procedures, Design, Equipment,
JAN 1997	HH65 FltRel	Aircraft was launched on early morning SAR to assist a F/V aground and breaking up. First victim was located lying face down in debris. The unconscious, unresponsive victim had improperly donned a PFD. As the victim was being brought into the cabin, the victim began to slip out of the quick-strop. FM and RS tried to hold the victim, but he slipped out of the PFD and the quick-strop.	Procedures, aircrew, Training, Design
MAR 1998	HU25	Fan spinner departed in flight. Large section of fan spinner lodged in engine bellmouth, resulting in engine damage and damage to fuselage, wing and horizontal stabilizer.	Material, Design, Procedures, Aircrew

Table 14

DOD CLASS "A" MISHAP RATES COMPARISON

Class A mishap rates for the DOD Services are compared in Table 15. When reviewing the DOD rates and comparing them to the Coast Guard, we need to consider the effect that our small number of flight hours has on our mishap rate. While one Class A mishap can greatly impact the Coast Guard mishap rate, one more or one less mishap would have little effect on the DOD rates. (NOTE: U.S. Navy data includes U.S. Marine Corps mishaps).

FY98/FY00 CLASS A AVIATION MISHAP RATES FOR ALL SERVICES

Class A Rates	FY99 USCG	USAF	USA	USN	FY00 USCG	USAF	USA	USN
Total Class A Rate	0.0	1.40	1.97	1.45	0.0	1.08	0.62	1.99
Fixed Wing	0.0	4.11	1.58	1.34	0.0	2.15	0.00	2.31
Rotary Wing	0.0	1.69	2.04	1.73	0.0	5.09	0.72	1.19
HC-130	0.0	0.0	N/A	0.0	0.0	0.37	N/A	0.0
HH-60	0.0	0.0	1.34	0.88	0.0	3.90	0.37	0.0

Table 15

PILOT FLIGHT TIME REVIEW

Table 16 displays the flight time for Pilots in Command (PIC) and Copilots (CP) involved in Class A and B mishaps for the last twenty years. In FY99 we began tracking crew flight time data for all reported aviation mishaps.

PILOT-IN-COMMAND/COPILOT (PIC/CP) EXPERIENCE (CLASS A & B MISHAPS FY81--FY00)

TOTAL FLIGHT TIME			TOTAL FLIGHT TIME IN MISHAP AIRCRAFT TYPE		
HOURS	PIC	CP	HOURS	PIC	CP
0-500	0	1	0-500	5	12
501-1000	2	5	501-1000	11	7
1001-1500	8	9	1001-1500	9	9
1501-2000	4	4	1501-2000	7	3
2001-3000	10	5	2001-3000	3	3
3001-4000	8	7	3001-4000	2	0
OVER 4001	7	4	OVER 4001	0	0
UNKNOWN	1	1	UNKNOWN	3	3
TOTAL MISHAPS	*40	*36	TOTAL MISHAPS	*40	*36

*Four mishaps involved single piloted mission.

Table 16

The term CP as used on this page refers to the pilot-not-in-command. It does not refer to the designation "copilot".

FY01 -- FLIGHT SAFETY PROGRAM

To improve future aviation operational performance and safety, we are working on the following for FY01:

Training Courses

- Traditional FSO training will continue with the Navy at NPGS Monterey, CA.
- COs will continue to receive the Command Safety Course at NPGS Monterey, CA.
- Advanced aviation safety training will be provided for selected FSO's as preparation for assignment to a Commandant convened mishap analysis board (MAB).
- FY00 FSO Annual Training will be held in April 01.
- Air Station Ops Officer's will be selected for Human Factors training in FY01.

Safety Standardization Visits

- The G-WKS-1 safety visit/program audits are now triennial and focus on flight safety program requirements contained in the Air Ops Manual, ORM Instruction and the Safety & Health Manual.
- The checklist used during aviation Safety Stan Visits is available upon request.
- Units may request unscheduled or informal assist visits and safety training at any time.

CRM

- We reached our goal of providing initial CRM training to 100% of Coast Guard pilots and crews in December 1997.
- Initial CRM training for CG aviation personnel is taught by ATC, ATTC, or by the USAF at Little Rock (C-130 crews).
- FSO's received CRM Refresher Course instructor training during the Annual FSO Annual Training.
- Refresher CRM can be taught by the unit FSO's, Stan Team members during Stan Visits or during P-courses or by McCord, AFB.

Privilege

- Joint ALCOAST 239/99 COMDTNOTE 5100 was published by safety and legal to remind all CG personnel of the policy regarding release of information from limited use mishap investigations.
- The ALCOAST is a reminder that COMDT (G-WKS) is the recognized record holder for

Limited Use mishap investigations and should be consulted in all matters regarding release of such mishap investigations.

- The ALCOAST is aimed at preventing inappropriate or unauthorized disclosure of information or promises of disclosures.

MRM

- Introductory briefings on Maintenance Resource Management (MRM) were presented during FY00 at various conferences.
- G-WKS-1 is sponsoring an FY03 resource proposal for fleetwide MRM training.
- G-WKS-1 is working with ATTC to develop a curriculum for fleetwide training of all aviation maintenance personnel.
- Initial introductory training was provided to FSO's at FY00 annual training.
- Two trial courses were conducted at Airstas Savannah and North Bend during FY00.

Reverse Cycle OPS (RCO)

- Current crew rest and scheduling guidelines for night operations are inappropriate for today's CG. New guidelines for night operations have been proposed for operational commanders.
- LANT and PAC prototyped this guidance during shore based FW and cutter based RW deployments. Feedback from the field is being evaluated.
- WKS staff will be evaluating the effects of HITRON operational requirements (e.g., extended night missions) on crew endurance.

VADR (CVR/FDR)

- Both helicopter fleets now have VADR installed.
- G-WKS-1 is sponsoring an FY03 resource proposal to provide data and voice recorders for the fixed wing fleet.
- Computer animated simulation of mishaps and retrieval of voice and data from data and voice recorders have greatly enhanced mishap investigation and loss control.
- Animated presentations will be done for significant mishaps investigations. VADR downloads with animation have been used in four mishap investigations.
- VADR downloads of data only have been done on twenty-five occasions to assist FSO's and Engineering Officer's.
- In addition, VADR information has proven invaluable as a maintenance troubleshooting tool. Msg DTG 232036ZNOV98 establishes procedures for using the HH60J/HH65A VADR's for non mishap situations.
- ARSC is developing a Process Guide for VADR downloads.
- VADR simulations are currently being used for CRM training.
- Requests for VADR downloads are made through ARSC in consultation with WKS-1.

AVIation Accident TRacking System (AVIATRS)

- The aviation safety database (***AVIATRS***) resides on the CG Standard Workstation III.
- ***AVIATRS*** captures all the information in the aviation mishap message. All information reported in the message can now be searched and retrieved.
- Contact G-WKS-1 for data searches and aviation mishap summaries from ***AVIATRS.***

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Hail and Farewell: WKS-1 will be saying farewell to LCDR Kalita this spring. We welcomed LCDR Val Welicka to the staff during the summer of 2000.